

# A PROJECTILE LAUNCH DETECTION SYSTEM UTILIZING A CONTINUOUS WAVE RADIO FREQUENCY SIGNAL TO CONFIRM MUZZLE EXIT

## Abstract

A projectile launch detection system utilizes a continuous wave radio frequency signal (CW/RF) to confirm muzzle exit. The projectile launch detection system can be used in smoothbore, fin-stabilized, non-air breathing projectiles. The gun tube appears as a waveguide to the projectile launch detection system during projectile launch. The projectile launch detection system transmits a CW/RF signal down the gun tube during launch of the projectile. A portion of the CW/RF signal is reflected back by an impedance mismatch at the boundary between the muzzle of the gun tube and free space. Upon exit by the projectile from the gun tube, an exit signature is detected that is defined by the impedance of the gun tube and by a ratio of the diameter of the gun tube to the frequency of the CW/RF signal. The projectile launch detection system processes the exit signature to detect a muzzle launch of the

projectile from a specific gun tube.